



Technical Improvement Opportunities

A3 Breakout Session Report-Out

**Solar America Initiative
Technical Exchange Meeting
April 17, 2006**



What issues do you anticipate in DOE's use of SAM as a tool to aid project evaluation?

- Caution. It's "easy to play with numbers". Modeling results are sensitive to assumptions, e.g., lifetime – cost of silicon – financial terms, with a dramatic effect on LCOE.
- For comparisons among submissions, perhaps *fix* certain assumptions.
- Need basic rules on how to use the model.
- Perhaps require submissions to provide data for a *range* of assumptions.
- DOE model assumptions looked optimistic. Will teams be judged on meeting reasonable expectations, or on their optimism?
- The model should be able to accommodate different technologies, different performance characteristics with varying light levels, etc.
- Model assumptions affect results. Need a way of comparing proposals by fixing the input or running the model with different assumptions and plot results.
- Are there metrics/credits for BIPV – how does that fit into the model?



What issues do you anticipate in DOE's use of SAM as a tool to aid project evaluation? (continued)

- There are other metrics consumers use to make decisions. How does the model account for these – e.g., aesthetics?
- Can play with numbers to get anything you want. Don't use this process to probe for optimism. Make requirement like we did in school, i.e., "Show Your Work". Perhaps require submissions to "benchmark your values" – tell us where you're beginning.
- Make distinction of whether we want cost or selling price. What are we asking for?
- Not clear how to benchmark relatively new products – things that no one else is doing.
- How will we deal with "leapfrog" technologies in the model. No hard data.
- May want to fix parameters like cost of money, inflation, duration of finance, to get comparable numbers from submissions.
- Beneficial to include BOS to some point, but may not make sense in some cases -- like inverter, if don't work on inverters. Have flexibility to "buy" and assume some reasonable value in SAM.
- Could take the optimizations from each submission and combine them to use the best of all.



How well does *LCOE as a metric* fit your approach to the PV value chain?

- One suggestion was that \$/kWp is the important metric – delivering on goal of “dropping the cost”. However, there’s general support for focus on kWh over a day – with proviso of modeling assumptions being known/fixed.
- Need to hear from the consumers on what they use to make their decisions, like aesthetics. Other things matter to consumers in addition to cost.
- Are there metrics for meeting market demands besides costs? E.g., some people make decisions based on “color”. How is this captured? Select projects with the most promise of success based on what the market wants. Bring in information on what SEIA and systems integrators know of markets.
- Perhaps look at what the Venture Capitalists are looking at for metrics. Looking at LCOE as panacea, and perhaps there’s more (soundness of business plan).
- There’s isn’t a metric for ES&H (e.g., how important is decommissioning)



How well does the *TIO structure* fit your approach to the PV value chain?

Can you design target systems and formulate an R&D project plan within the TIO systems engineering framework?

- In TIOs, “impact” assessment missed the boat on identifying the importance of systems integration – very important potential for cost savings.
- Some concern expressed about vertically integrated teams – Don’t need every component manufacturer on the team. May cause a company to de-focus if they’re generally focused on other components (cells, modules). Even though approach described allows for “buy”, emphasis in presentation over and over was on systems. Could take care of this by having several tiers.
- General support for systems approach and kWh



Other Key Points Discussed

- How are we going to do our R&D? Are there roles for universities?
- There hasn't been much discussion of yield and throughput.
- PV seems myopic – think we need to create our own infrastructure. For volume, have to leverage existing infrastructure – e.g. homebuilders.
- To get GW levels, need deep pockets or capital efficiency. Feed-in tariffs?
- An elephant in the room is silicon shortage. Not addressing this.
- Don't forget infrastructure needs for getting to GW levels.
- Storage not something to address now? Or is it very important? Mixed.



Around the room: Final thoughts on most important issues to consider

- Lot of important issues. Don't have a clear approach. Don't know how to deal with that many factors (e.g., not involved in inverters).
- Don't overestimate power of modeling.
- Industry going to kWh/day – great step forward
- Tier 1 and Tier 2 needed
- Not just SAM – also “show your work”
- Be convincing that can deliver on proposal
- Likes systems approach - cost share
- Know how people are going to do R&D – universities' roles
- Efficient processing and driving down the cost
- Will have to be R&D and economies of scale
- Annual kWh production
- Whether SAM is just a model for Si – can it do different technologies?



Around the room: Final thoughts on most important issues to consider (continued)

- Reliability – whether 85 deg./85 relative humidity issue will be included – or lifetime – what kind of efficiency degradation do we assume?
- Moving toward evaluating on energy production rather than peak
- Definition of terminology – what is “integration”?
- Business plan, and monitoring performance of delivery by product price – projection of price decrease, delivering on plan
- Proposal and business plan needs discussion of how industry will have ability to produce equipment to ramp up
- kWh production and business plan to provide it
- Opportunity, installed and labor cost important
- Customer is king, volume important
- Maybe should be a quantifiable Marketing Improvement Opportunities-MIOs